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Zikidou, Stavroula and Hadjidema, Stamatina

University of Piraeus, Greece

2020

Online at <https://mpra.ub.uni-muenchen.de/99388/>

MPRA Paper No. 99388, posted 03 Apr 2020 16:03 UTC

Household Health Expenditure in Greece and the Impact of Financial Crisis

Zikidou^a, Stavroula and Hadjidema^b, Stamatina

^a Phd candidate, Department of Economics, University of Piraeus, Greece, email: szikidou@bioacademy.gr

^b Professor, Department of Economics, University of Piraeus, Greece, email: sh@unipi.gr

Abstract

The **aim** of this paper is to investigate, through economic science tools, the impact of economic downturn and Memorandum health policies, under the hypothesis that Household Health Expenditure (HHE) was increased. Apart from that, a **secondary objective** is to interpret the Greeks behavior of consumption towards health services over time. In this context, by using **multiple regression analysis** on the raw micro-data of Greek **Household Budget Surveys** of 1987, 1994, 1999, 2004, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018, in the **STATA vs 13**, we examined the differentiation to the level of private health spending, as regards households sociological characteristics and to what extent private spending could be foreseen/ affected by some characteristics of the population, as well as by financial crisis.

Analysis demonstrated that households over time had less income and thus, because of the inelasticity of demand for Health, they spent greater proportion of their income for health. The results, also, showed a rise in the proportion of spending on drugs, therapeutic devices, equipment and hospital care and reduction on medical services expenditure. Regarding the determinants of demand, i.e. the socio-economic characteristics, we examined the age of the household in charge, the place of residence and the household type/ synthesis. The findings showed that households in urban areas spend more money on health compared to households in rural areas, over time. In particular, households in rural areas spend more money on drugs, therapeutic appliances and equipment than households in urban areas, while households in urban areas spend more on medical services and hospital care compared to households in rural areas. The analysis of data regarding the age of the household in charge showed that the average total HHE was reduced regardless of the age of the household in charge. Over time, the ages that appear to spend a higher proportion of their income on health are those over 65 years. Moreover, it was observed, as is logical, that

the higher the age group of the household in charge, the higher the total health expenditure over time. Furthermore, age increase is associated with higher monthly costs for medicines, therapeutic appliances and equipment. It should also be noted that the average monthly expenditure on medicines, therapeutic appliances and equipment in each age group were stable during the crisis with a slight upward trend.

Consequently, over the years of financial crisis, the monthly HHEs are reduced due to the confiscation of revenue the middle class suffered by, which reduced their consumption ability. Bearing in mind that larger proportion of their shrinking income is now spent for health (since, healthcare is inelastic commodity and hence difficult to be “restrained”), HHE, as a percentage of total private spending, is consequently increased, in line with the hypothesis hereof, namely that *“during the economic recession and implementation of the fiscal adjustment measures in Greece, Greek household health spending was increased”*.

Keywords: Health & healthcare spending, Greece, Household health expenditure, Recession, Austerity, Financial Crisis Impact, Economic Adjustment, Household Budget Survey (H.B.S.), multiple regression analysis

JEL Classification: C39, D12, I12.

Introduction

Greek healthcare system faces public funding gap, as a result of the current financial crisis and relevant austerity measures being forced. Official data have shown that Greece’s GDP has been contracted by 25%¹ within the last decade (2008 to 2018), and this has had an impact on health expenditure of Greek households (of already high O.P.P.), as well. Based on literature review, it is clear that most OECD countries followed, more or less, the same route: increase in spending during pro crisis period and declining afterwards. The austerity program, in which Greece entered due to financial crisis, seems to significantly affect HHE, as well. Examining interannual micro-data of Greek Household Budget Surveys, we could have an enlightening picture of the evolution of private health expenditure in Greece over

¹ from 242 billion euro in 2008, to 184,70 billion euro in 2018 (HEL.STAT., 9/2019)

the last ten years, while, resulting conclusions for both household groups most affected, and the impact of the economic crisis in the health sector in general.

Material and Methods

In the present study pre-form (raw) data derived from the Greek Statistical Authority (HEL.STAT.), concerning private health expenditure from the Household Budget Surveys (HBS) of years 1987, 1994, 1999, 2004, and annually from 2008 to 2018. We should bear in mind that HBS are carried out at random and at regular basis², by HEL.STAT., throughout Greek territory. Through these surveys, information on consumer spending, income, housing facilities, consumer durables and household socio-economic characteristics and its members are collected. In regard to health expenditure, HBS records, inter alia, households' responses to pharmaceuticals expenditure-treatment-equipment devices, non-hospital medical and hospital care services, not individually, but on household level, since household in-charge-person reflects the costs and consumer behaviors of entire household. Within this content, data were extracted- provided, as mentioned above, in primary form and those which were used referred to private health expenditures over time, in full and according to the characteristics of the country's households. Data analysis was performed with STATA software version 13 and for the purpose of research the technique of **multiple regression analysis** was used. Subsequently, techniques used in data analysis are shortly presented.

Multiple regression analysis

Multiple regression analysis refers to a set of techniques for the study of the linear relationship between two or more variables. Multiple regression calculates coefficients β in the equation:

$$Y = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n$$

The X_i are the independent variables. The Y is the dependent variable. Beta (β) is the unknown regression coefficients. Their estimates are represented by b . Each β represents the initial unknown (population) parameter, and b is an estimate of this β . Although the

² every four years formerly and on an annual basis from 2008 onwards

regression problem can be solved by various techniques, the most frequent method is the least squares. In least squares regression analysis (OLS- Ordinary Least Square), the b are selected so as to minimize the sum of errors squared.

In this research, as dependent variable was set to be the variable that relates to total HHE and as independent variables were defined household characteristics. The results of the regression indicate if and which of the households characteristics could explain the total HHE.

Results

1. Health Expenditure

In Table 1 is presented the monthly HHE in total and per subcategory. The results indicate that the average monthly HHE fell from 142.1 Euros in 2008 to 107.99 Euros in 2018. Health expenditure, as a percentage of income, ranged from 6.71% in 2008 to 7.49% in 2018, showing that, despite the average health expenditure decreased over time, the health expenditure percentage on income increased. This is an indication that households, over time, have less income and thus, spent a greater proportion of this income for health costs. Additionally, the results show that monthly household spending on medicines, therapeutic appliances and equipment increased from 33.02 Euros in 2008 to 38.96 Euros in 2018. Similarly, monthly household spending on hospital care increased from 21.54 Euros in 2008 to 35.85 Euros in 2018. In contrast, monthly household spending for medical care decreased from 87,54 Euros in 2008 to 33.18 Euros in 2018.

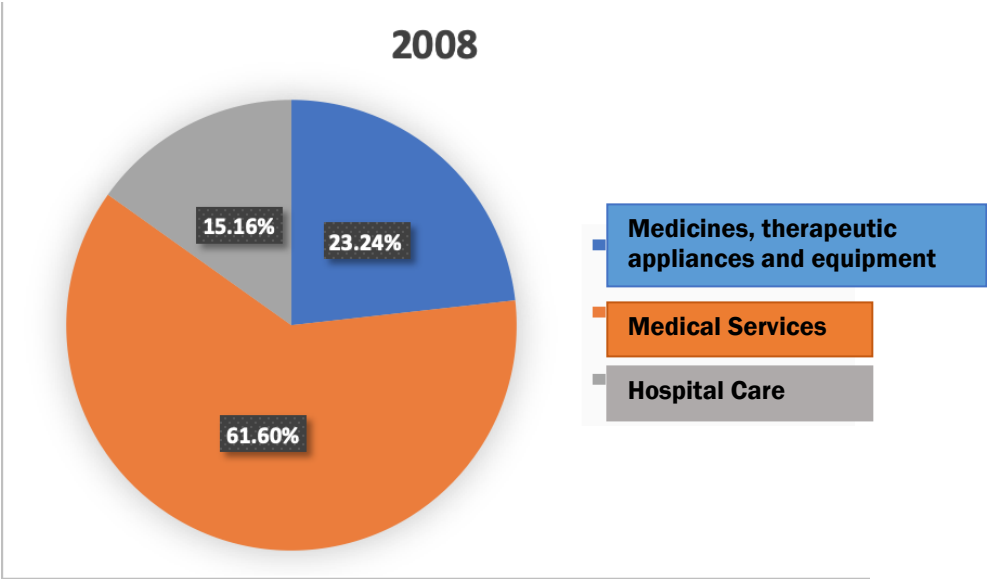
Table 1: Average monthly HHE & subcategories, 2008-2018

Year	Total Health Spending			Medicines, therapeutic appliances and equipment		Medical care services		Hospital care services	
	Amount/ month	Percentage over the total expenditure s	Percentage over the total income	Amount /month	Percentage over the total HE	Amount / month	Percentage over the total HE	Amount/ month	Percentage over the total HE
2008	142.1	5.56%	6.71%	33.02	23.24%	87.54	61.60%	21.54	15.16%
2009	134.27	5.41%	6.50%	31.25	23.27%	79.48	59.19%	23.55	17.54%
2010	124.43	5.29%	6.36%	32.23	25.90%	67.3	54.09%	24.9	20.01%
2011	114.58	5.17%	6.28%	30.84	26.92%	57.09	49.83%	26.66	23.27%
2012	104.71	5.21%	6.40%	32.52	31.06%	43.54	41.58%	28.66	27.37%
2013	104.44	5.62%	6.92%	37.13	35.55%	38.15	36.53%	29.16	27.92%
2014	106.72	5.94%	7.32%	39.85	37.34%	35.63	33.39%	31.25	29.28%
2015	107.36	6.09%	7.56%	39.6	36.89%	33.54	31.24%	34.22	31.87%
2016	103.68	5.98%	7.45%	39.1	37.71%	31.83	30.70%	32.75	31.59%
2017	103.33	5.87%	7.31%	38.78	37.53%	32.03	31.00%	32.51	31.46%
2018	107.99	6.04%	7.49%	38.96	36.08%	33.18	30.73%	35.85	33.20%

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

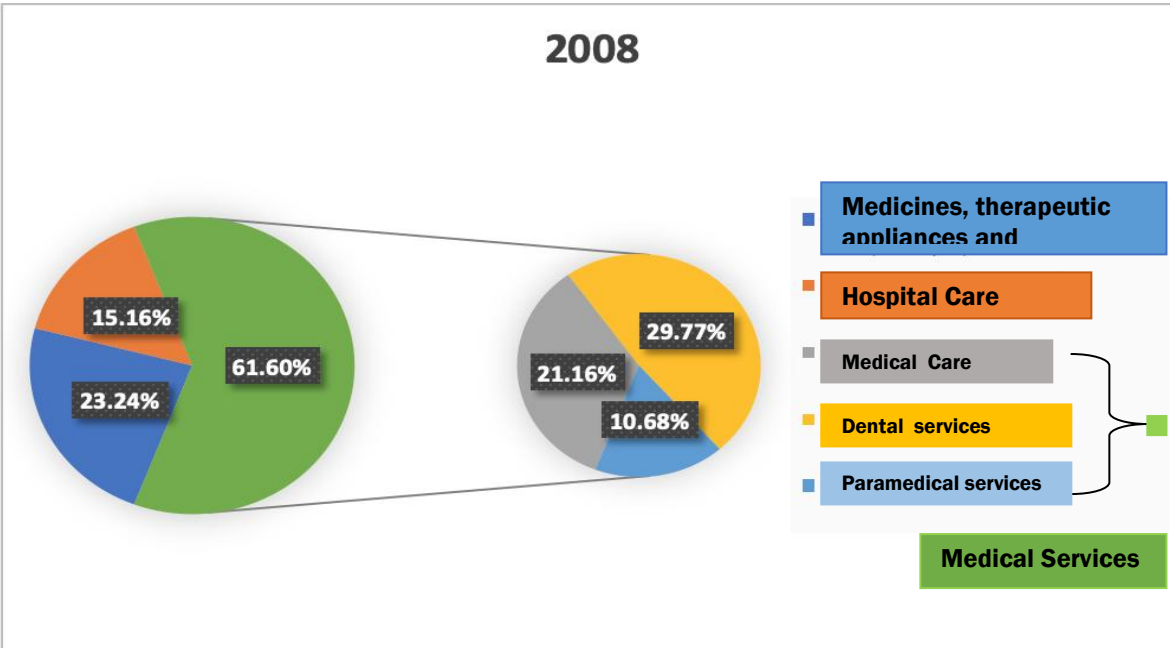
The evolution of each category of expenditure, as a percentage of total health expenditure, is given in Graphs 1 and 6. As illustrated in Graph 1 and 2, in **2008**, the main category of health spending was medical services expenditure (61.6%), followed by expenditure on medicines, therapeutic appliances and equipment (23.24%) and the category with the least expenditure was that of hospital care (15,16%). Additionally, within the costs for medical care, the most important subcategory seemed to be dental services with a share of 29.77% of the total medical expenditure, while a small percentage referred to expenditure for paramedical services (10.68%) of the total medical expenditure.

Graph 1: *Health expenditure per category, as a percentage of total health expenditure, 2008*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Graph 2: *Health expenditure per category and subcategories, as a percentage of total health expenditure, 2008*



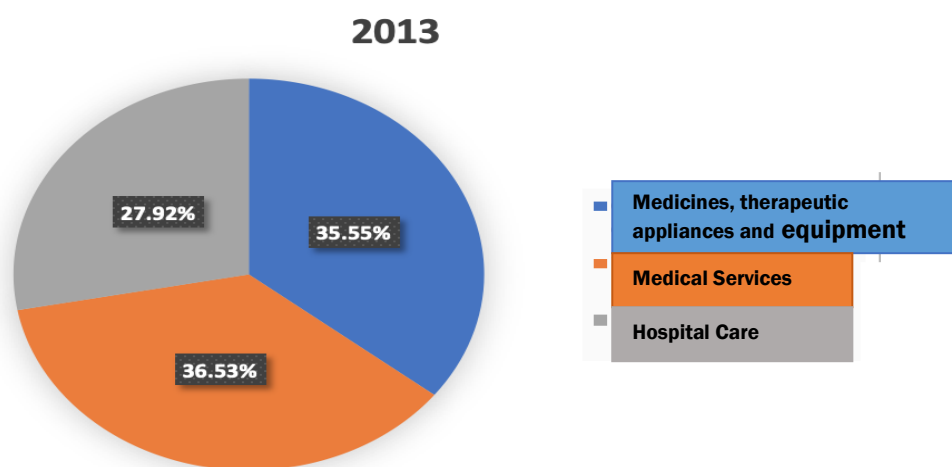
Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Moreover, Graphs 3 and 4 show that in **2013** the main category of health expenditure was still medical services spending (35.56%), followed by expenditure on medicines, therapeutic

appliances and equipment (35.55%) and the category with the least health costs was that of hospital care (27.92%).

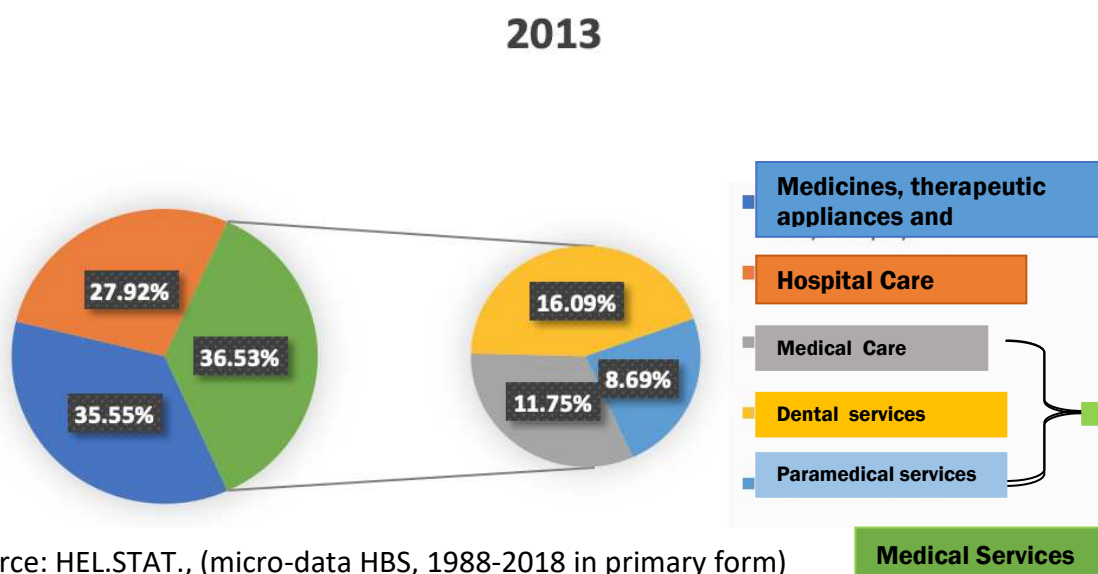
Additionally, within the costs for medical care, the most important subcategory seemed to be, once again, dental services with a share of 16.09% of total HHE, while the proportion of paramedical services costs decreased slightly (8.69%). In other words, the results indicate a rise in the proportion of expenditure on medicines, therapeutic appliances and equipment, and hospital care and reduction on medical services spending.

Graph 3: *Health expenditure per category, as a percentage of total health expenditure, 2013*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

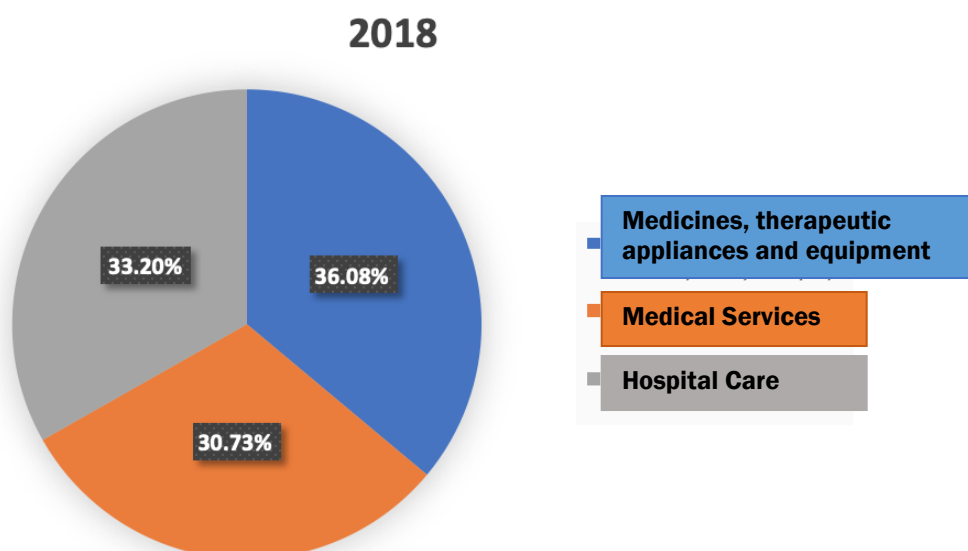
Graph 4: *Health expenditure per category and subcategories, as a percentage of total health expenditure, 2013*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

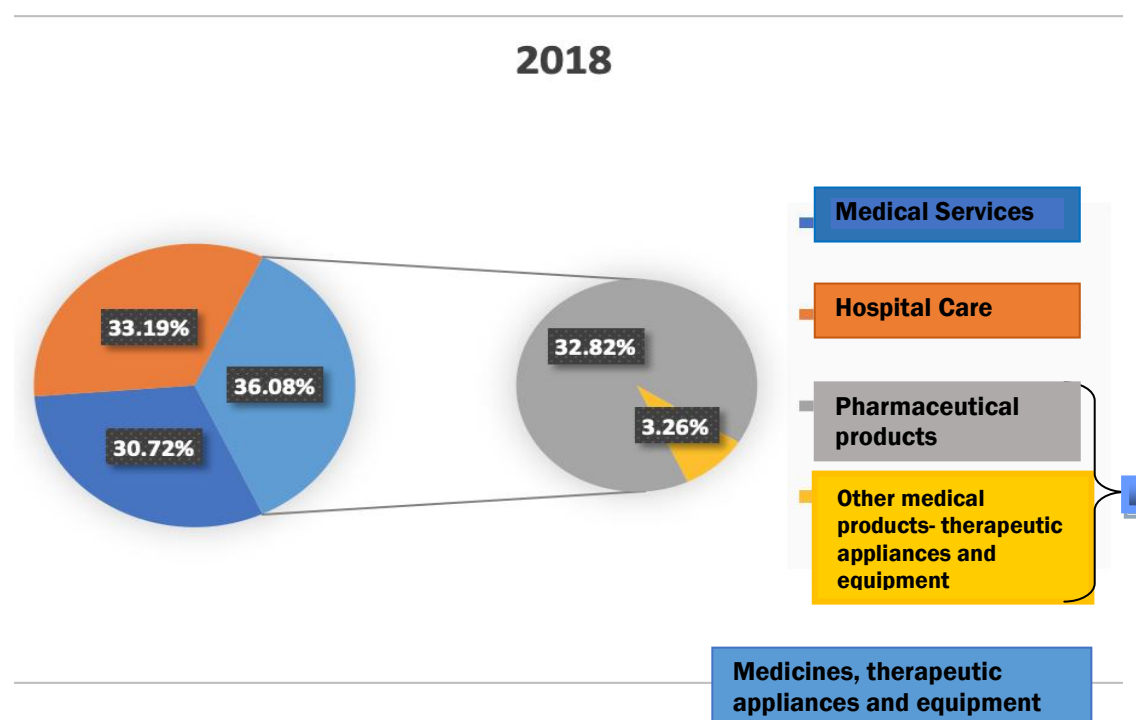
Lastly, Graphs 5 and 6 show that in **2018** the main category of health spending is medicines, therapeutic appliances and equipment (36.08%), followed by hospital care costs (33.2%) and the category of fewer costs were medical services (30.73%). In addition, within expenditure on medicines, therapeutic appliances and equipment, the most important subcategory seemed to be pharmaceutical products with a percentage of 32.82% of the total expenditure, while a small percentage were spending on other medical products and medical devices/ equipment (cumulatively 3.26%).

Graph 5: *Health expenditure per category, as a percentage of total health expenditure, 2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Graph 6: *Health expenditure per category and subcategories, as a percentage of total health expenditure, 2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

2. Health expenditures in relation to the area of residence

This section presents the findings of the analysis regarding households' residence area. More specifically, Table 2 includes data on the average monthly HHE during period 2008-2018. Accordingly, the **total monthly HHE in urban areas in 2008** was 147.98 Euros corresponding to 5.45% of total household spending and 6.57% of total household income. Results showed that in urban areas, monthly health expenditures were reduced over the years and reached the amount of 112,09 Euros in 2018, corresponding to 6.57% of total household expenditure and 7.48% of total household income.

As refers to the **rural areas**, results indicate that the total monthly HHE in **2008** was 120.27 Euros, corresponding to 6.22% of total household expenditure and 7.60% of total household income. The results showed, also, that in rural areas, the monthly spending were decreased over the years and reached 89.91 Euros in 2018, corresponding to 5.87% of total household expenditure and 7.55% of total household income.

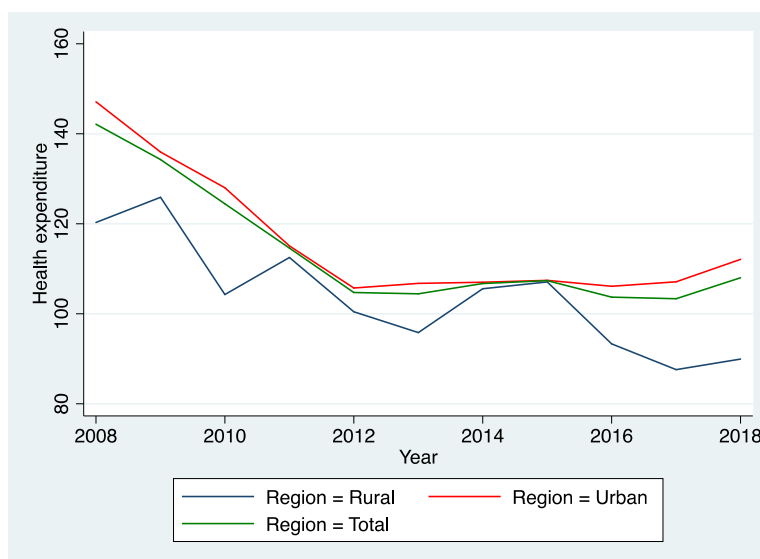
Table 2: Average HHE for the period 2008-2018 in terms of area of residence

Year	All areas			Urban areas			Rural areas		
	Health Expenditure	Percentage over the total expenditures	Percentage over the total income	Health Expenditure	Percentage over the total expenditures	Percentage over the total income	Health Expenditure	Percentage over the total expenditures	Percentage over the total income
2008	142.1	5.56%	6.71%	147.08	5.45%	6.57%	120.27	6.22%	7.60%
2009	134.27	5.41%	6.50%	135.94	5.21%	6.24%	125.88	6.78%	8.38%
2010	124.43	5.29%	6.36%	127.99	5.25%	6.27%	104.25	5.63%	7.04%
2011	114.58	5.17%	6.28%	115.06	4.95%	5.99%	112.48	6.45%	8.05%
2012	104.71	5.21%	6.40%	105.72	5.03%	6.16%	100.45	6.16%	7.74%
2013	104.44	5.62%	6.92%	106.73	5.53%	6.76%	95.8	6.02%	7.66%
2014	106.72	5.94%	7.32%	107.01	5.78%	7.09%	105.55	6.69%	8.46%
2015	107.36	6.09%	7.56%	107.43	5.90%	7.26%	107.07	7.02%	9.02%
2016	103.68	5.98%	7.45%	106.11	5.92%	7.31%	93.3	6.32%	8.23%
2017	103.33	5.87%	7.31%	107.1	5.88%	7.27%	87.59	5.78%	7.51%
2018	107.99	6.04%	7.49%	112.09	6.07%	7.48%	89.91	5.87%	7.55%

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Data of Table 2 regarding monthly total expenditure are also illustrated on Graph 7 below.

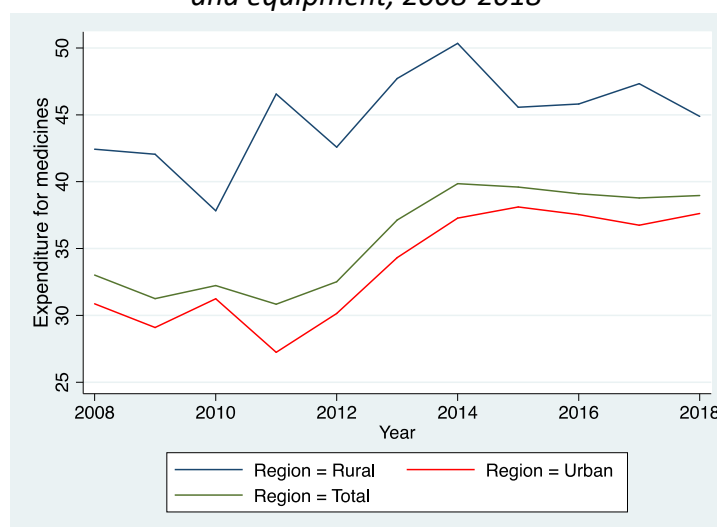
Graph 7: *Evolution of health expenditure by region*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Furthermore, results with respect to household expenditure on **medicines, therapeutic appliances and equipment**, which are illustrated below on Graph 8, indicate that monthly household expenditure in **urban areas** rose from 30.87 Euros in 2008 to 37.62 Euros in 2018. Similarly, the monthly household expenditure in **rural areas** rose from 42,43 Euros in 2008 to 44.88 Euros in 2018. This means that households in rural areas spend more money on medicines, therapeutic appliances and equipment in comparison to households in urban areas, over time.

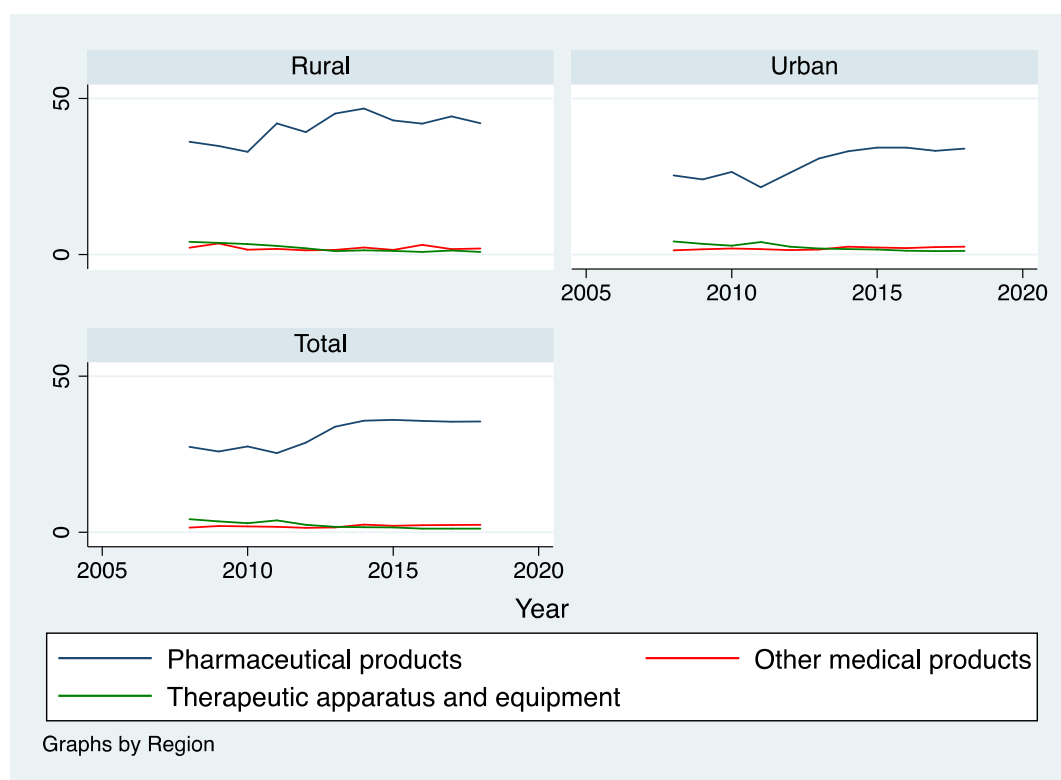
Graph 8: *Evolution of health expenditure by region, medicines, therapeutic appliances and equipment, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Regarding HHE subcategories, particularly **medicines, therapeutic appliances and equipment**, Graph 9 shows that over time both in urban as well as in rural areas, households were spending mostly for pharmaceutical products, while to very small extent expenditures were related to other medical products and medical devices / equipment.

Graph 9: *Evolution of health expenditure by region, medicines, therapeutic appliances and equipment, 2008-2018*

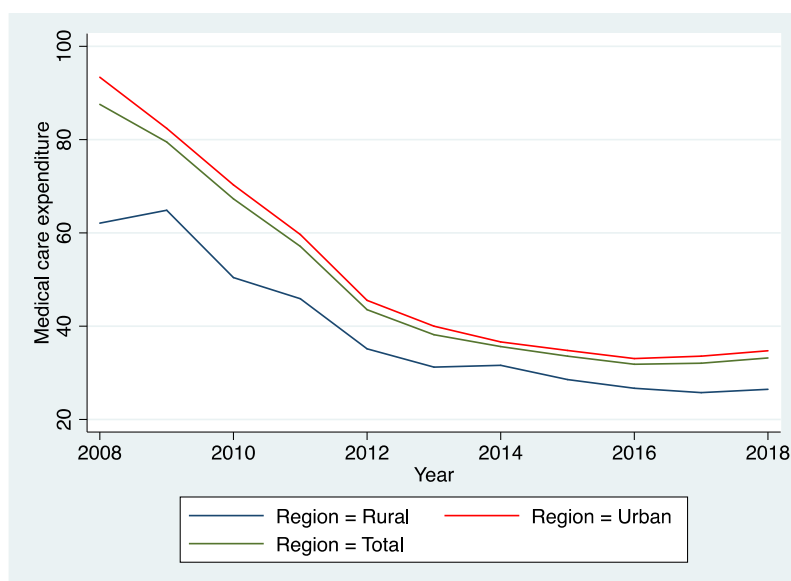


Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Graph 10 illustrates HHE on medical services and suggests that monthly household expenditure in **urban** areas fell from 93.35 Euros in 2008 to 34.7 Euros in 2018. Similarly, monthly household expenditure on medical services in **rural** areas decreased from 62,09 Euros in 2008 to 26.46 Euros in 2018.

Moreover, it is observed that over time households in urban areas spend more money on medical services than households in rural areas.

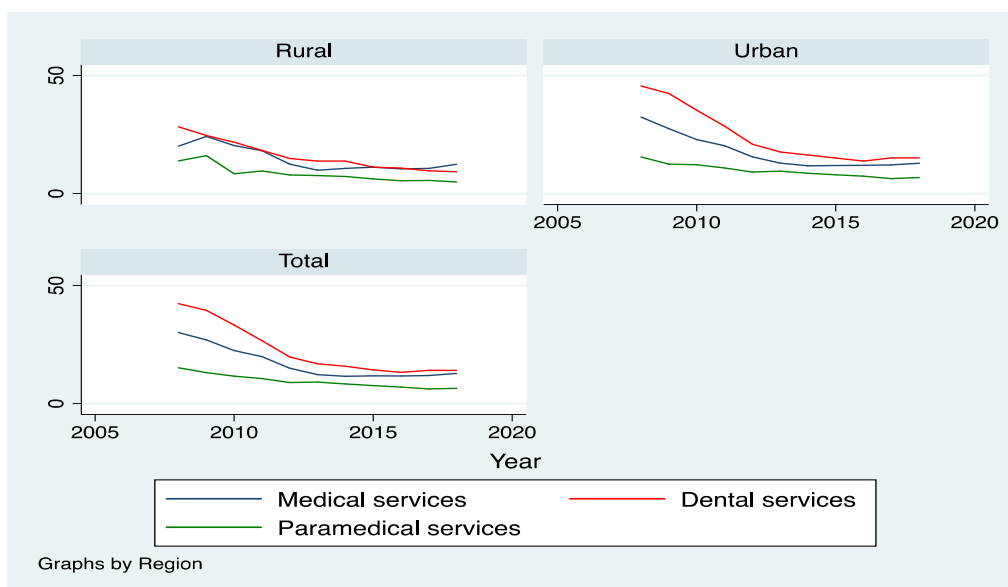
Graph 10: *Evolution of health expenditure by region, on medical services*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

The results with respect to the subcategory of household expenditure on medical services are illustrated on Graph 11. It is clear that over time, in both urban and rural areas, households were spending mostly for dental services and to a lesser extent for paramedical services.

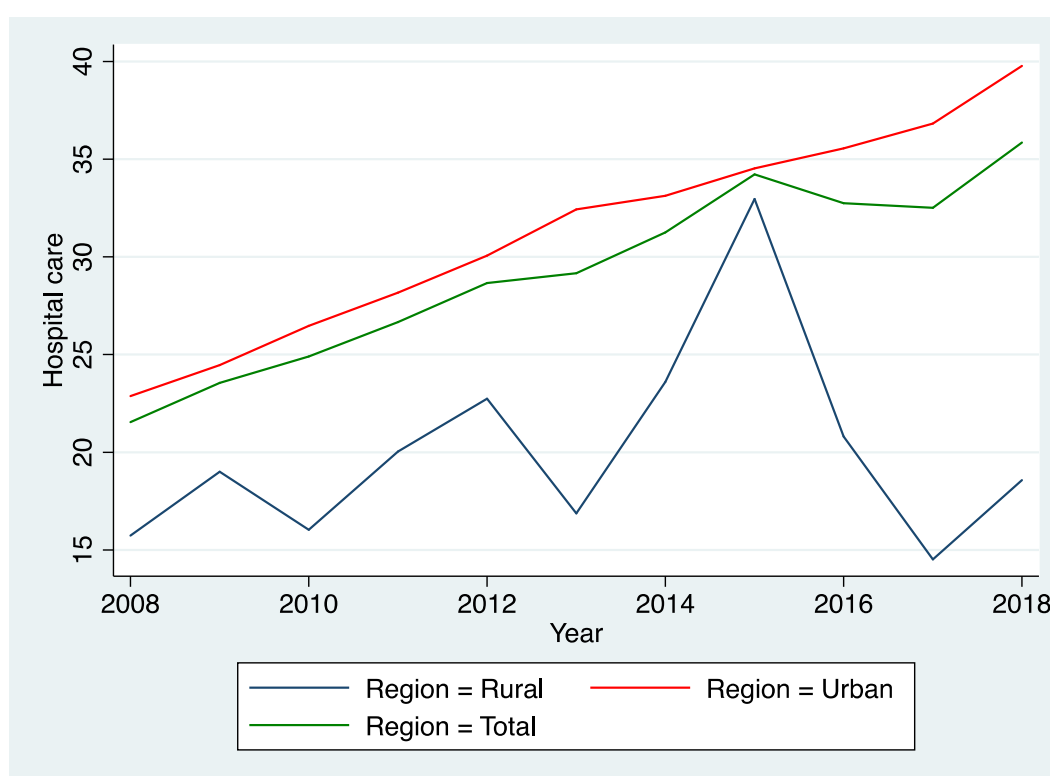
Graph 11: *Evolution of health expenditure by region, on medical services, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

The results with respect to households' expenditure in **hospital care** are shown in Graph 12, according to which it is shown that monthly household spending in **urban areas** from 22.87 Euros in 2008 rose to 39.77 Euros in 2018. Similarly, monthly household spending in **rural areas** for hospital care of 15.74 Euros in 2008 rose to 18.57 Euros in 2018. This means that over time households in urban areas spend more money on hospital care compared to those in rural areas.

Graph 12: *Evolution of health expenditure by region, hospital care*

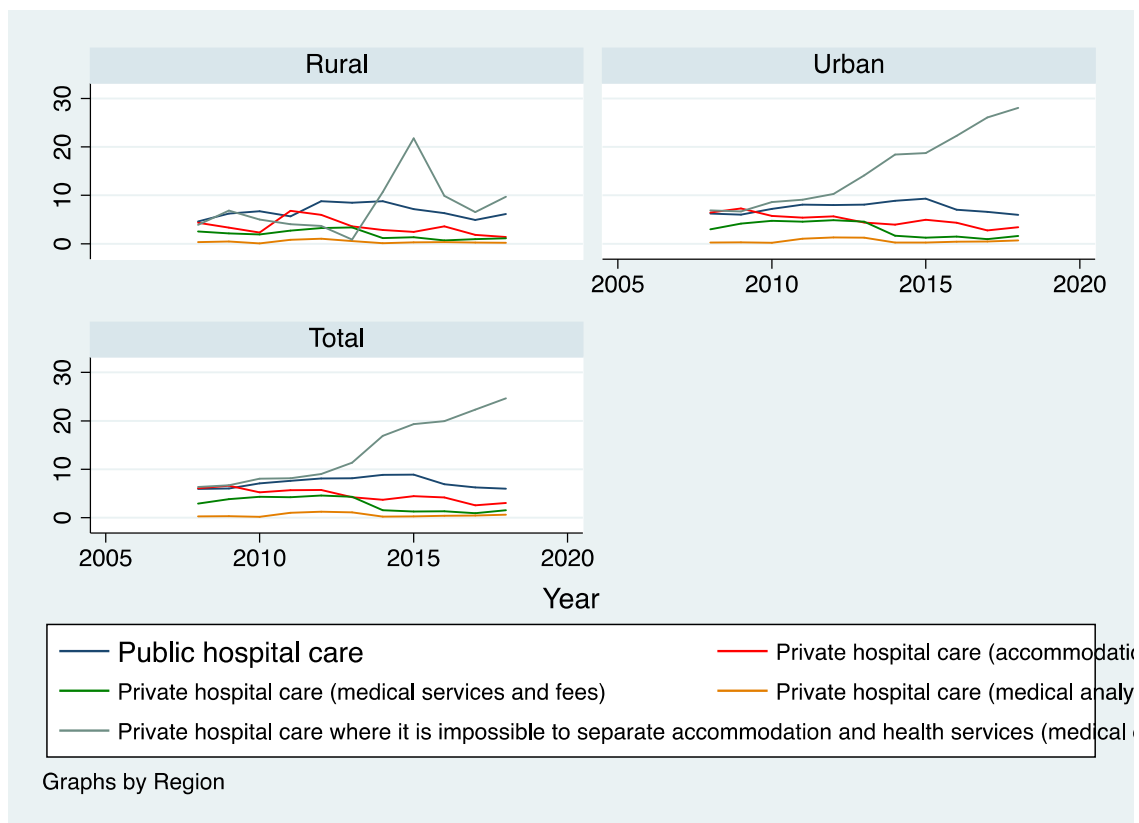


Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

The results with respect to households' expenditure in hospital care can be also seen illustrated in Graph 13. As shown, in urban areas during the years 2008 and 2009, the costs for hospital care were mostly related to expenditures for public and private hospital care (accommodation, nutrition, etc.). From 2010 onwards, there was a rapid increase on household spending in urban areas in terms of private hospital care where it is impossible to separate accommodation and health services (medical or paramedical). In contrast, the results show that in rural areas the costs for hospital care were mainly spending on public hospital care, while from 2013 onwards households expenditure in urban areas with respect

to the private hospital care where it is impossible to separate accommodation and health services (medical or paramedical) rose rapidly.

Graph 13: *Evolution of health expenditure in hospital care, by region, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

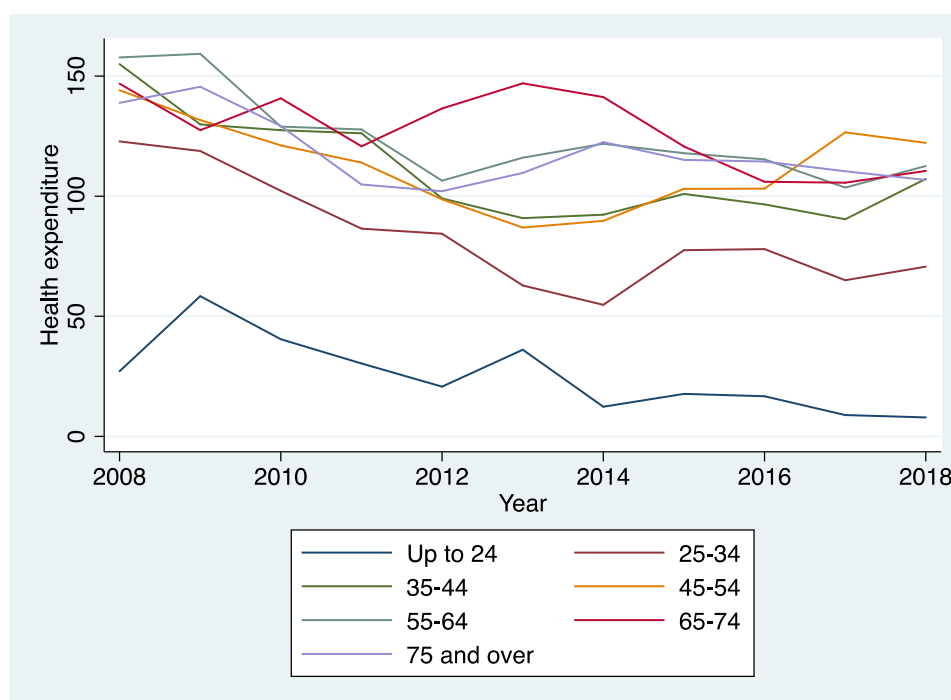
3. Health expenditures in relation to age of the household in charge

This section presents the findings of the analysis related to the *age* of the household in charge. Table 3 presents the data regarding the average monthly expenditure for the period from 2008 to 2018 related to the age of the household in charge. Results show that total monthly HHE in 2008 for person aged **up to 24 years old** was 27.13 Euros, corresponded to 2.07% of the total income of the household. The percentage for year 2018 was 0.84% or 7.96 Euros. Total monthly expenditure for households' charge aged from **25 to 44 years old** in 2008 was 122.76 Euros, corresponded to 5.21% of the total income and in 2018 was 70.68 Euros, corresponded to 4.36% of households' total income.

Accordingly, total monthly expenditure in groups of household's charge **aged between 35 to 44 years old** in 2008 was 154.91 Euros, a percentage of 4.52% of the total income of the household and in 2018 was 107.19 Euros or 5.31%. Additionally, total monthly expenditure in groups of householder between 45 to 54 years old in 2008 was 144.11 Euros, a percentage of 4.52% of the total income of the household and in 2018 was 122.19 Euros or 5.31% of the total household income. The group of householder aged **between 55-64 years old** spent 157.76 Euros in 2008, or 5.22% of their total income, while in 2018 the same group spent 112.52 Euros or 5.47% of their income. Following the group of **65-74 years old** householder, the expenditure in 2008 amounted to 146.82 Euros, a percentage 7.39% of the households' total income and in 2018 amounted to 110.47 Euros or 7.18%. Finally the group of householder aged **over 75 years old** spent 138.84 Euros in 2008, or 9.54% of household's total income and in 2018 the same group spent 106.77 Euros or 8.94%, respectively.

Results described above are shown in the following Graph 14.

Graph 14: *Evolution of health expenditure related to the age of the household in charge, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Table 3: Average HHE for the period 2008-2018 in terms of the age of the household in charge

Year	Έως 24		25-34		35-44		45-54		55-64		65-74		75 and over	
	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]
2008	27.13	2.07%	122.76	5.21%	154.91	4.95%	144.11	4.52%	157.76	5.22%	146.82	7.39%	138.84	9.54%
2009	58.36	3.86%	118.82	5.23%	129.89	4.54%	131.63	3.98%	159.27	5.53%	127.48	6.51%	145.56	10.45%
2010	40.45	2.70%	102.24	4.87%	127.46	4.86%	121.15	4.04%	128.97	4.76%	140.68	7.00%	129.21	8.92%
2011	30.38	2.13%	86.5	4.42%	126.18	4.72%	113.94	4.14%	127.72	4.95%	120.72	6.67%	104.88	8.39%
2012	20.77	1.76%	84.39	4.74%	99.08	4.24%	98.71	4.02%	106.41	4.59%	136.5	7.87%	102.06	8.50%
2013	36.11	2.96%	62.87	3.66%	90.85	4.46%	86.93	3.83%	116.01	5.51%	146.98	8.34%	109.66	9.42%
2014	12.36	1.27%	54.78	3.36%	92.31	4.42%	89.71	4.00%	121.83	5.86%	141.22	8.88%	122.45	10.94%
2015	17.74	1.42%	77.5	4.47%	100.92	4.94%	103.06	4.77%	117.86	5.92%	120.67	7.95%	115.07	10.13%
2016	16.75	1.82%	77.98	4.79%	96.59	4.83%	103.14	4.80%	115.31	5.83%	106.02	7.06%	114.44	9.87%
2017	8.92	1.02%	65.04	4.04%	90.41	4.56%	126.57	5.60%	103.56	5.24%	105.62	6.79%	110.34	9.23%
2018	7.96	0.84%	70.68	4.36%	107.19	5.39%	122.19	5.31%	112.52	5.47%	110.47	7.18%	106.77	8.94%

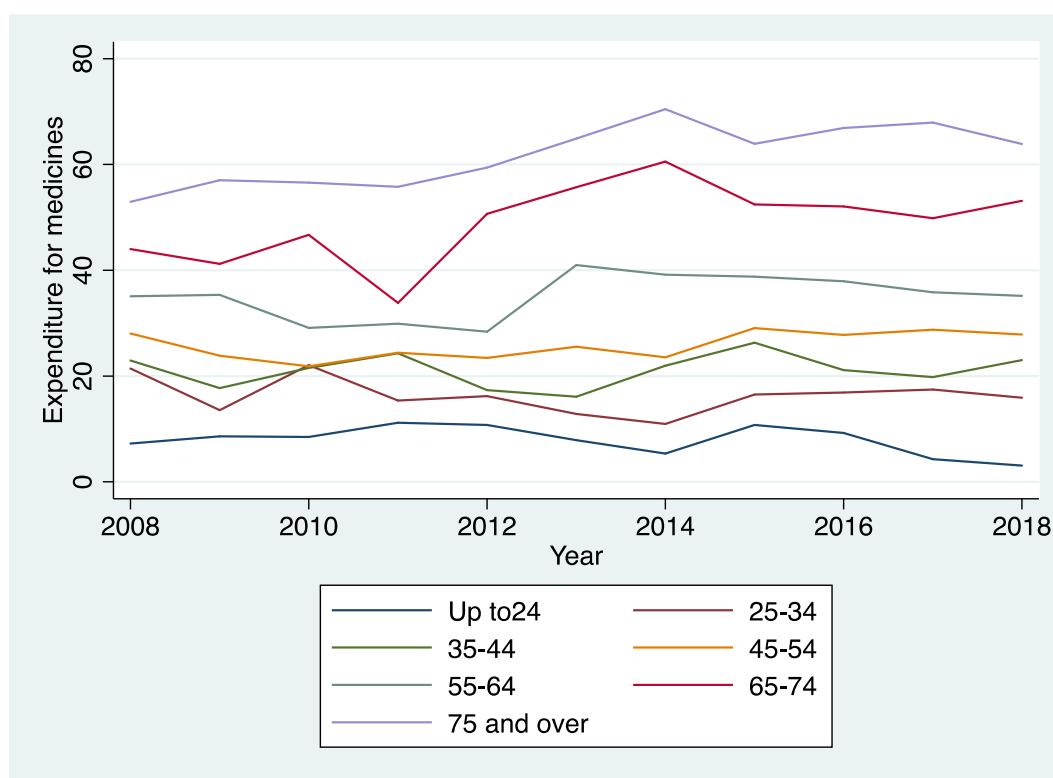
[1]= Health Expenditure

[2]= Percentage of total income

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Results, regarding expenditure for medicines, therapeutic devices and equipment in relationship with householder's age, are presented in Graph 15, showing that over time it is higher in households where person in charge was over 75 years old. This is quite logical, given the longer life expectancy humanity has achieved over time and the increasing needs for ensuring the higher possibly quality of their health level, through medicines and other therapeutic appliances and equipment.

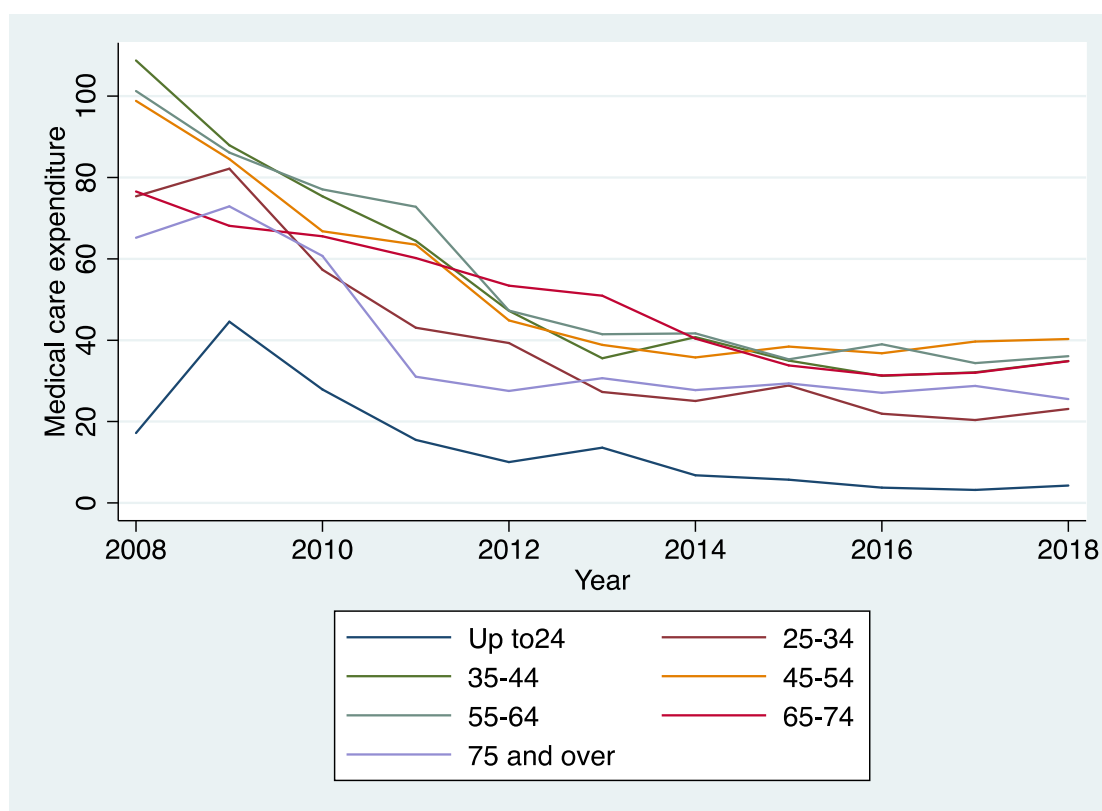
Graph 15: *Evolution of health expenditure related to the age of the household in charge, in terms of medicines, therapeutic devices and equipment, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Results, regarding HHE on medical services in relation with householder age are presented in Graph 16. As it is shown, all age groups decreased their costs in medical services. In addition, it can be seen that the majority of medical expenditure was spent by the group of 35-74 years old. In more detail, as it refers to year 2018 the group of 45-54 years old spent more, followed by households of 35-44 years old and then 65-74 years old.

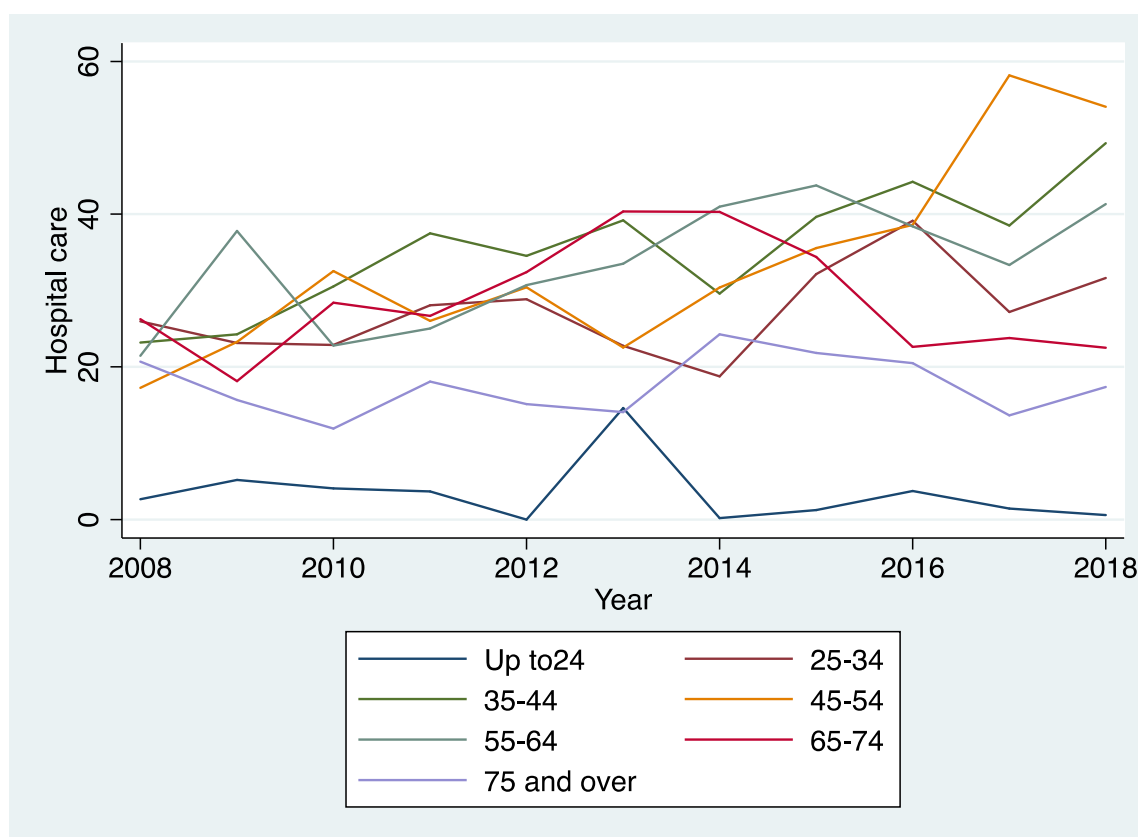
Graph 16: *Evolution of health expenditure related to the age of the household in charge, in terms of medical services, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Results, regarding HHE in hospital care services in relation with householder age are presented in Graph 17. Expenditure were increased during ages 45 to 74 years old. In addition, it can be seen that the majority of hospital care expenditure were spent by this age group. In more detail, for the year 2018 the group of 45-54 years old spent more, followed by households of 35-44 years old and then 55-64 years old.

Graph 17: *Evolution of health expenditure related to the age of the household in charge, in terms of hospital care services, 2008-2018*



Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

4. *Health expenditure on the type (synthesis) of the household*

This section presents the findings of the analysis in terms of household synthesis. In Table 4 data presented with respect to the monthly average household spending, for 2008-2018 in terms of their synthesis. Results show that the highest average total costs over time belonged to the households consisting of a couple and a child up to 16 years. The average expenditure for this type of households in 2008 was 221.68 million (6.92% of income) and decreased to 157.99 million (6.77% of income in 2018). Similarly, high HHE belonged to households consisting of a couple with two children up to 16 years. The average monthly expenditure for this type of households in 2008 was 172.85 Euros (5.2% of income) and decreased to 135.27 million (5.31% of income in 2018). Finally, high HHE belonged to households consisting of a couple with three children up to 16 years. The average monthly expenditure for this type of households in 2008 was 156.55 Euros (4.4% of income) and decreased to 152.51 million (5.70% of income in 2018).

Table 4: Average HHE for the period 2008-2018 in terms of household synthesis

Year	A person alone under the age of 65		A person alone aged 65+		Couple alone		Couple with 1 children up to 16 years old		Couple with 2 children up to 16 years old		Couple with up to 3 children up to 16 years old	
	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]
2008	57.6	3.46%	86.71	8.24%	147.89	7.07%	221.68	6.92%	172.85	5.20%	156.55	4.40%
2009	84.64	5.01%	108.36	10.06%	154.23	7.37%	156.95	5.38%	144.36	4.52%	129.63	4.09%
2010	50.89	3.35%	88.05	8.16%	133.96	7.05%	132.94	4.78%	150.16	5.01%	146.63	5.00%
2011	52.84	3.53%	78.09	7.80%	125.69	7.00%	151.46	5.22%	128.64	4.41%	153.13	5.30%
2012	47.56	3.50%	75.17	7.80%	103.34	6.37%	128.57	5.16%	119.94	4.47%	157.08	5.67%
2013	54.94	3.92%	96.04	9.91%	106.81	6.51%	122.23	5.25%	100.02	3.92%	91.79	3.99%
2014	41.39	3.26%	99.51	10.73%	123.2	7.99%	98.5	4.42%	111.12	4.43%	82.61	3.27%
2015	49.64	3.86%	87.59	9.19%	119.47	7.52%	116.18	4.98%	121.70	4.95%	133.48	5.21%
2016	53.17	4.48%	89.13	9.71%	124.30	7.64%	136.50	6.15%	108.85	4.73%	110.87	4.33%
2017	38.76	3.32%	86.08	9.14%	113.14	6.89%	139.28	6.37%	127.17	5.27%	108.83	3.87%
2018	45.49	3.85%	84.01	8.99%	114.25	7.16%	157.99	6.77%	135.27	5.31%	152.51	5.70%

[1] = Health Expenditure

[2] = Percentage of total income

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

(continuation) Table 4: Average HHE for the period 2008-2018 in terms of household synthesis

Year	Single parent with 1 children or more up to 16 years old		Couple or single parent with children above 16 years old		Other kind of household	
	[1]	[2]	[1]	[2]	[1]	[2]
2008	87.2	3.77%	159.39	5.26%	144.92	4.79%
2009	155.88	5.38%	136.81	4.51%	130.10	4.59%
2010	121.27	4.75%	136.66	4.58%	141.49	5.31%
2011	102.31	4.07%	127.36	4.64%	111.78	4.75%
2012	53.19	3.28%	124.13	5.01%	112.53	5.18%
2013	80.9	4.55%	124.06	5.60%	125.19	5.56%
2014	66.51	3.55%	128.3	5.92%	123.3	5.47%
2015	69.24	3.50%	122.15	5.95%	123.74	6.15%
2016	81.18	4.95%	110.66	5.42%	99.14	4.84%
2017	76.65	5.07%	114.24	5.49%	113.45	5.41%
2018	68.51	4.42%	119.09	5.55%	115.26	5.35%

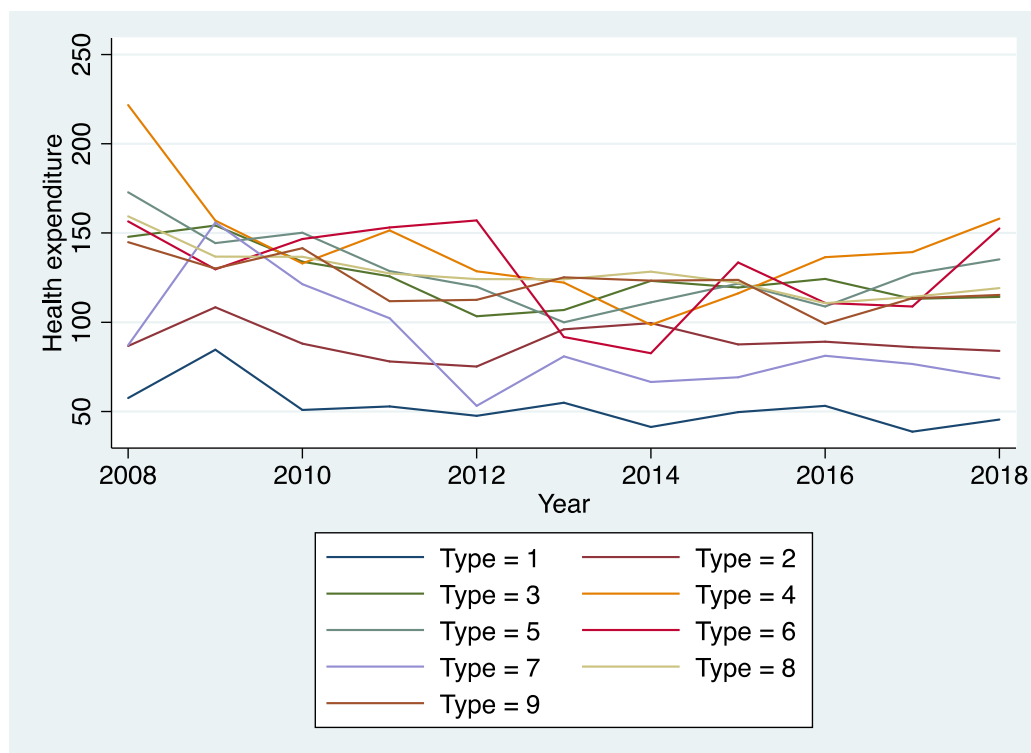
[1]= Health expenditure

[2]= Percentage of total income

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

Households that over time have been having less average health expenditure were those comprised by (1) a person under the age of 65, (2) by a person older than 65 years and (3) a parent to a child or more up to 16 years old. Results are shown in Graph 18.

Graph 18: *Evolution of health expenditure in terms of household synthesis, 2008-2018*



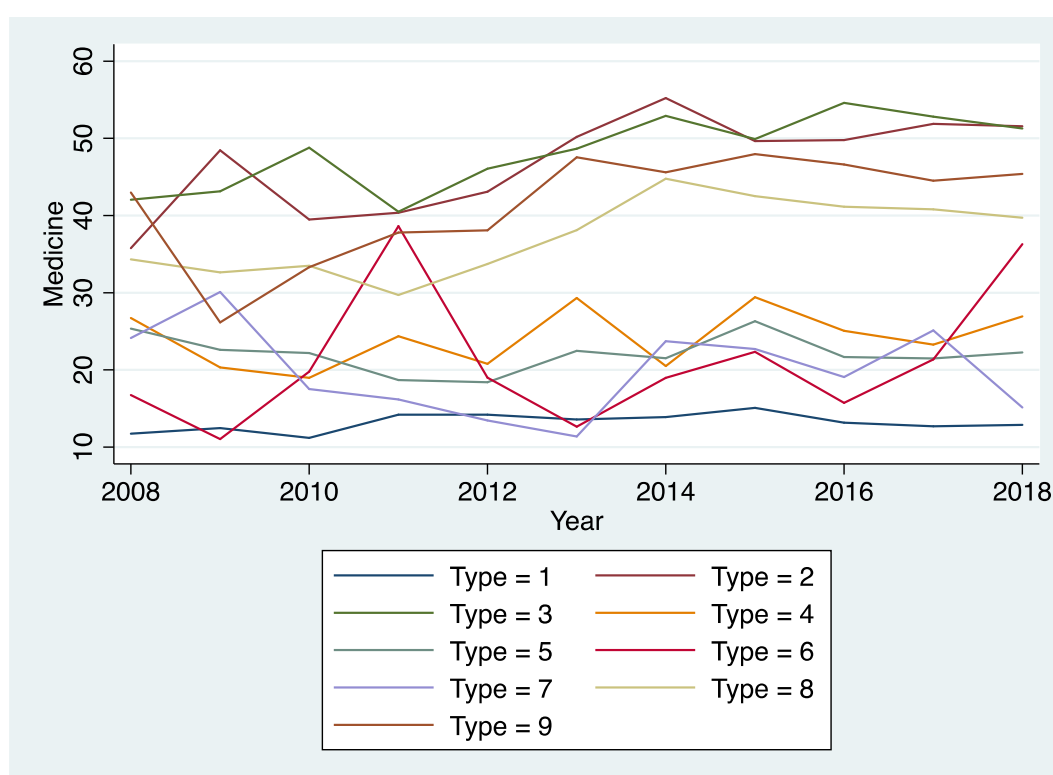
Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

([1]= a person alone under the age of 65, [2]= a person alone aged 65+, [3]= Couple alone, [4]= Couple with 1 children up to 16 years old, [5]= Couple with 2 children up to 16 years old, [6]= Couple with up to 3 children up to 16 years old, [7]= Single parent with 1 children or more up to 16 years old, [8]= Couple or single parent with children above 16 years old, [9]= Other kind of household)

Results regarding HHE on medicines, therapeutic appliances and equipment as per type household, is illustrated below in Graph 19. Accordingly, **over time the monthly spending for medicines/drugs, therapeutic appliances and equipment were higher**

in households composed by (1) a single person aged 65 years or more, (2) a couple alone and (3) another type of Household. In contrast, households with the lowest monthly costs to medicines, therapeutic appliances and equipment were those comprised by (1) a single person aged 65 years or older, (2) a parent with one child or more up to 16 years, (3) a couple with a child up to 16 years and (4) a couple with three or more children up to 16 years.

Graph 19: *Evolution of health expenditure on medicines, therapeutic appliances and equipment, per household type, 2008-2018*

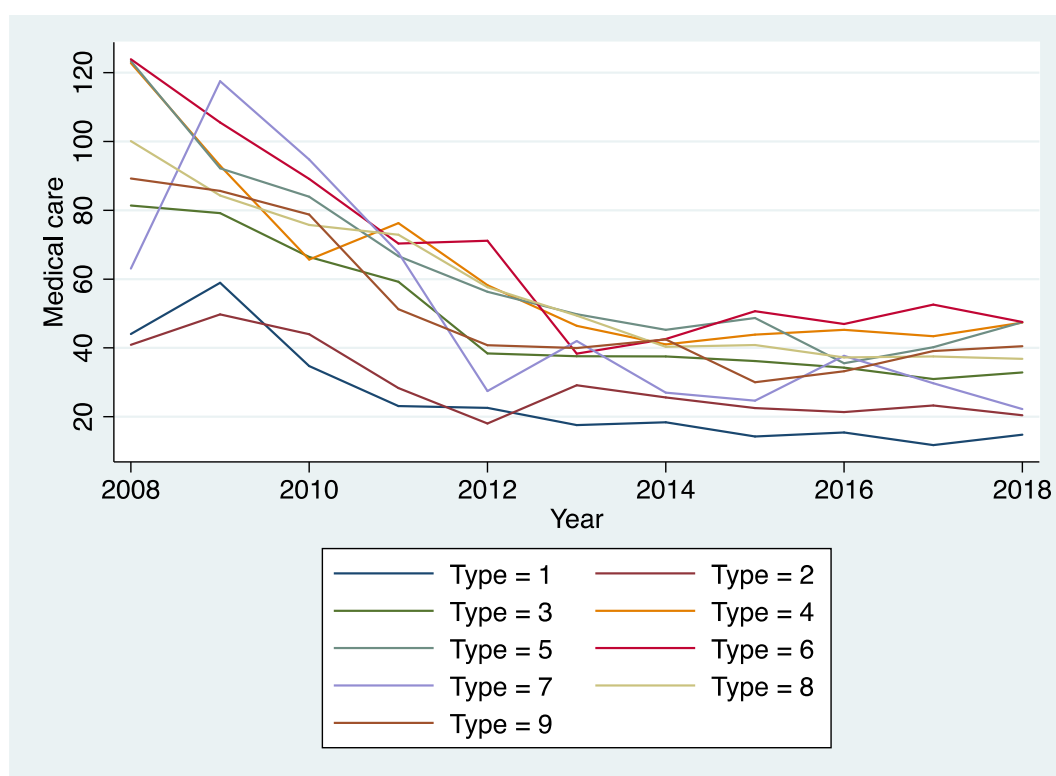


([1]= a person alone under the age of 65, [2]= a person alone aged 65+, [3]= Couple alone, [4]= Couple with 1 children up to 16 years old, [5]= Couple with 2 children up to 16 years old, [6]= Couple with up to 3 children up to 16 years old, [7]= Single parent with 1 children or more up to 16 years old, [8]= Couple or single parent with children above 16 years old, [9]= Other kind of household)

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

The results regarding household spending for medical services as to households synthesis, are shown in Graph 20, which shows that **over time monthly expenditures for medical services decreased in all household types**. Moreover, it appears that **most of the costs for medical services belonged to households consisting of (1) a couple with a child up to 16 years, (2) a couple with two children up to 16 years, and (3) a couple with three more children up to 16 years.**

Graph 20: *Evolution of health expenditure on medical services, per household type, 2008-2018*

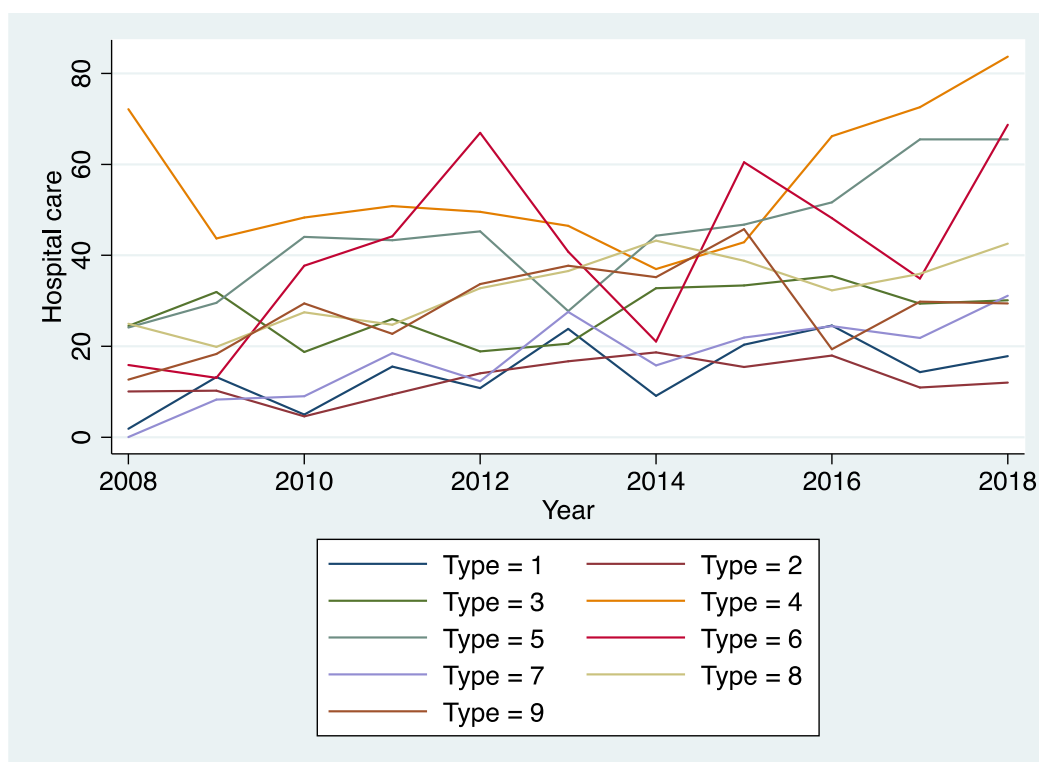


([1]= a person alone under the age of 65, [2]= a person alone aged 65+, [3]= Couple alone, [4]= Couple with 1 children up to 16 years old, [5]= Couple with 2 children up to 16 years old, [6]= Couple with up to 3 children up to 16 years old, [7]= Single parent with 1 children or more up to 16 years old, [8]= Couple or single parent with children above 16 years old, [9]= Other kind of household)

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

The results with respect to HHE for hospital care as per household type, are shown in Graph 21, where it is shown that **monthly costs for hospital care have been increased over time for households consisting of a couple with three or more children up to 16 years, for households consisting of a couple with two children up to 16 years and for households consisting of a couple with a child up to 16 years.**

Graph 21: *Evolution of health expenditure on hospital care services, per household type, 2008-2018*



([1]= a person alone under the age of 65, [2]= a person alone aged 65+, [3]= Couple alone, [4]= Couple with 1 children up to 16 years old, [5]= Couple with 2 children up to 16 years old, [6]= Couple with up to 3 children up to 16 years old, [7]= Single parent with 1 children or more up to 16 years old, [8]= Couple or single parent with children above 16 years old, [9]= Other kind of household)

Source: HEL.STAT., (micro-data HBS, 1988-2018 in primary form)

5. Regression Results

The results of multiple regression analysis are shown in Table 5. Analysis revealed that **the total health expenditure can be predicted to a significant extent on the age of the in charge person of the Household and the Household's synthesis**. Moreover, it emerged that health costs related to **drugs-medicines, pharmaceutical products, therapeutic appliances and equipment** can be predicted to a considerable extent by the **household's area (residence) and age of the household person in charge**. Finally, health expenditure related to hospital care can be predicted to a significant extent by the **household's area, age of the in charge person of the Household and the Household's synthesis**. From the signs of the coefficients b it is indicated that the higher the age group of the household in charge person, the greater the total health expenditure ($b = 13.56$, $p < 0.05$). Similarly, it follows that the higher the age group of the household in charge person, the greater the costs of drugs, pharmaceuticals, therapeutic appliances and equipment ($b = 8.61$, $p < 0.05$), for medical services ($b = 3.40$, $p < 0.05$) and hospital care ($b = 1.55$, $p < 0.05$). Additionally, it is shown that households in rural areas spend on average, 4530 Euros more in drugs, pharmaceutical products, therapeutic appliances and equipment ($b = -4.53$, $p < 0.05$) compared to households in urban areas. On the contrary, it appears that in urban areas, on average, households spend 4550 Euros more for hospital care ($b = 4.55$, $p < 0.05$) compared to households in rural areas. Finally, households with children have higher total costs ($b = 5.12$, $p < 0.05$), higher expenditure for medical services ($b = 3.34$, $p < 0.05$) and more spending for hospital care ($b = 1.37$, $p < 0.05$).

Table 5: *Regression Results*

Explanatory variables	Health Expenditure	Pharmaceuticals	Medical Services	Hospital Care Services
Area	5.04	-4.53**	5.03	4.55**
Age	13.56**	8.61**	3.40**	1.55*
Household type/ synthesis	5.12**	.0412	3.34*	1.37*

6. Discussion

These kinds of results should be taken into account when designing and implementing health policy. The analysis confirmed that particularly as regards to the pharmaceutical expenditure, merited indeed more care, legal assistance and implementing controls in order to limit the over-prescription phenomenon. Promoting the consumption of generic drugs was also a major step forward that actually contributed (not only for Greece) to total expenditure on pharmaceuticals and other medical supplies reduction.

7. Limitations

Perhaps the most important limitation of any study concerning private health expenditure is the lack of data on informal payments (under the table payments to medical staff, etc.) which constitute the phenomenon of shadow economy and make the already enormous private health costs at even higher levels. Although part of these informal payments is included in HBS, making them more reliable than other surveys, in no way they are considered to be representative of the actual size. In addition, presented data in this study may not fully reflect Greek health expenditure, given the relatively short period of studying. Further research and comparative analysis are needed, to identify the impact of Greece's financial crisis on HHE, whereas the effect of economic crisis appears clearer over the longer periods of time.

8. Conclusions

According to the research findings, households over time had less income available and thus, due to inelasticity of demand of Health, they have been spending a greater proportion of their income on health costs. Results, also, showed a rise in the proportion of HHE on medicines, therapeutic appliances and equipment and hospital care services and reduction on medical services expenditure. Moreover, by 2013 the biggest part of HHE is spent on medical services (percentages ranging from 61.6% to 36.53%), while in 2013-2018, the biggest part of HHE is spent on medicines, therapeutic appliances and equipment (percentages ranging from 37.34% to

37.71%), while firmly in the second place of spending were expenditures for hospital care services.

From the analysis of data regarding the household's area, it was shown that over time households in urban areas spend more money on health compared to households in rural areas. In addition, these results indicate that, **in both urban and rural areas, the monthly amount of health expenditure decreased significantly within the decade of the recession, but the percentage of income spent remained stable.** Such an observation is reasonable, since the average household income has been decreased and therefore, households, both in rural and urban areas, while they reduced the amount of money that they spent, the percentage of their income remained the same. With other words, households now spend the same percentage of income on health, but in absolute terms the figure is lower because of the lower income. Moreover, the results showed that households in rural areas spend more money over time on medicines, therapeutic appliances and equipment than households in urban areas, while households in urban areas spend more money on medical services and hospital care in comparison to households in rural areas.

Furthermore, the data analysis regarding the age of the household in charge showed that the average total HHE were reduced regardless of the age of the household in charge. **Over time, the age groups that appear to spend a bigger proportion of income on health are those over 65 years old. Moreover, it was observed that over time the age increase is associated with higher monthly costs for medicines, therapeutic appliances and equipment.** This is quite logical, given the longer life expectancy humanity has achieved over time, with the consequent increasing needs of people to maintain a satisfactory health level through medicines and other therapeutic devices. Also, from the results it was shown that average monthly expenditure on medicines, therapeutic devices and equipment, in each age group was stable during the reporting period with a slight increasing trend. Last but not least, the data analysis, as to the type of Greek households, showed that households of less average health expenditure over time were those that consisted of a person

under the age of 65 years old, a person over the age of 65 years old and a parent with one or more children(s) up to 16 years old.

On the basis that Health Expenditure will sparingly begin to rise, in the foreseeable future, **it is recommended that** Health Policy planning should consider the severe impact of population ageing, with simultaneous smaller share of active population, which means significant revenue shortfalls and healthcare funding difficulties.

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